



Sub-ocean Drilling

For the past 20 years, the National Science Foundation (NSF) has been conducting a highly successful program involving exploration of Earth's crust by drilling beneath the ocean floor and bringing up core samples. The program's aims include substantiation and refinement of the plate tectonic theory, which holds that Earth's continents and oceans continuously change; determining the impact of such changes on climate and ocean circulation; and establishing the geological framework in which natural resources are formed and distributed.

Last year, NSF initiated a new phase of exploration, a 10-year effort—jointly funded by NSF and several major oil companies—known as the Ocean Margin Drilling Program (OMDP). Described as one of Earth's last scientifically unexplored frontiers, the ocean margin is the region of Earth's crust between the continental shelf and the deep ocean abyss. Exploring it demands a ship with capabilities beyond those of existing drillships; it must drill in 13,000 feet of water to a depth 20,000 feet below the ocean floor. To meet these requirements, NSF is considering the conversion of the government-owned mining ship *Glomar Explorer* to a deep ocean drilling and coring vessel. *Glomar Explorer* is shown at left in its mining ship configuration. Below is the ship's large





“moon pool” through which drilling equipment can be lowered; the moon pool can be opened or closed to the sea by gates which slide on rails along the hull bottom. The photo above shows the computer control center where technicians monitor undersea operations and the “dynamic positioning” system which automatically holds the ship in precise position over the work site.

The decision to convert the ship was prefaced by a feasibility study, performed for NSF by Donhaiser Marine, Inc. (DMI), Houston, Texas, a naval architect/engineering firm specializing in services to the offshore petroleum industry. In the study, which

analyzed the ship’s characteristics for OMDP suitability and evaluated conversion requirements, DMI used a computer program supplied by NASA’s Computer Software Management and Information Center (COSMIC). With the COSMIC Ship Motion and Sea Load Computer Program, DMI was able to perform analysis which could not otherwise have been accomplished. The analysis, correlated with full scale sea tests, confirmed *Glomar Explorer’s* suitability. Engineering design work is under way and *Glomar Explorer*, if approved for conversion, is expected to begin operations as a drillship in 1984.